Amendments to the Claims

The following listing of claims replaces all prior versions and listings of claims in this application:

1. (Currently Amended) A method for recycling a substrate that has a ~~residue on its surface and a~~ detachment profile that includes a residual topography on its surface resulting from an ion implantation process, ~~comprising~~ which method comprises:

~~removing~~ applying an impact force to sever the residual topography ~~residue from the substrate to a level substantially equivalent to that~~ of the detachment profile ~~to obtain a substantially uniform planar surface on the substrate~~; and

polishing the entire surface of the substrate to eliminate defects and to prepare the surface in condition for molecular bonding to another substrate.

2. (Cancelled)

3. (Currently Amended) The method according to claim [[2]] 1 wherein the impact force is a ~~which further comprises applying~~ mechanical pressure applied at an angle relative to the surface of the substrate.

Claims 4. to 8. (Cancelled)

9. (Currently Amended) The method according to claim 1 wherein the impact force is ~~which further comprises using~~ a local ion attack to sever ~~remove~~ the ~~residue~~ residual topography.

10. (Currently Amended) The method according to claim 9 which further comprising directing an ion beam approximately perpendicular to the surface of the substrate to sever ~~remove~~ the ~~residue~~ residual topography.

11. (Original) The method according to claim 9 wherein the local ion attack is provided by an Argon ion beam.

12. (Cancelled)

13. (Currently Amended) The method according to claim [[12]] 1 wherein the impact force is ~~which further comprises using~~ a laser beam applied to sever the ~~residue~~ residual topography.

14. (Original) The method according to claim 13 wherein the laser beam is focused on at least the interface.

15. (Original) The method according to claim 13 wherein the laser beam is aligned parallel to the surface of the substrate.

16. (Currently Amended) The method according to claim 15 which further comprises focusing the laser beam onto the ~~residue~~ residual topography with a screen having a slit.

17. (Currently Amended) The method according to claim [[12]] 1 wherein the ~~residue~~ residual topography is severed by directing an impact force provided by at least one of a jet stream of water, a jet stream of air, and a jet stream of fluid at it.

18. (Currently Amended) The method according to claim 17 wherein the jet stream is directed against the ~~residue~~ residual topography at an acute angle to the surface.

19. (Original) The method according to claim 17 wherein the jet stream impinges at least on the interface.

20. (Currently Amended) The method according to claim [[12]] 9 which further comprises rotating the substrate to ~~remove or~~ to assist in severing the ~~residue~~ residual topography.

21. (Currently Amended) The method according to claim 1 ~~12 which further comprises applying~~ wherein the impact force is a shock wave applied on a back side of the substrate to sever the ~~residue~~ residual topography.

22. (Currently Amended) The method according to claim ~~12 which further comprises~~ wherein the impact force is applied by bombarding the residue with at least one of ions and ion clusters to sever the ~~residue~~ residual topography.

23. (Currently Amended) The method according to claim 22 which further comprises bombarding the ~~residue~~ residual topography at the interface with the ions or ion clusters.

24. (Currently Amended) The method according to claim 1 wherein the ~~residue~~ residual topography is ~~removed or~~ severed in a piecewise manner.

25. (Currently Amended) The method according to claim 1 further comprising planarizing the entire surface of the substrate after ~~removal~~ severing of the ~~residue~~ residual topography so that the surface is in a condition for bonding to another semiconductor substrate.

26. (Original) The method according to claim 25 which further comprises thinning the surface by about 0.1 to 0.3 μm during planarizing.

27. (Original) The method according to claim 1 wherein the substrate is planarized without a heat treatment.

28. (New) The method according to claim 9 which further comprises controlling removal of the residual topography with a mechanical profilometer.

29. (New) The method according to claim 9 wherein the substrate is sapphire, silicon carbide or gallium nitride .

30. (New) The method according to claim 1 wherein the substrate is sapphire, silicon carbide or gallium nitride.

31. (New) A method for recycling a substrate that has a detachment profile that includes a residual topography resulting from an ion implantation process, which method comprises:

removing the residual topography of the detachment profile by rotating the substrate while exposing at least the residual topography to a chemical substance that reacts with the residue; and

polishing the entire surface of the substrate to eliminate defects and to prepare the surface in condition for molecular bonding to another substrate.

32. (New) The method according to claim 31 which further comprises controlling the removal of the residual topography with a mechanical profilometer.

33. (New) The method according to claim 31 which further comprises covering a region on the surface with a protective layer before removing the residual topography.

34. (New) The method according to claim 33 wherein the protective layer is formed by photolithography.

35. (New) The method according to claim 33 wherein the protective layer is an etch resistant material and is applied prior to the chemical removal of the residual topography.

36. (New) The method according to claim 31 wherein the residual topography is removed in a piecewise manner.

37. (New) The method according to claim 31 wherein the substrate is sapphire, silicon carbide or gallium nitride.